HATCHERY AND GENETIC MANAGEMENT PLAN (HGMP)

Hatchery Program:	Winthrop National Fish Hatchery Leavenworth Hatchery Complex
Species or Hatchery Stock:	Spring Chinook Salmon
Agency/Operator:	U. S. Fish and Wildlife Service (USFWS)
Watershed and Region:	Methow River, tributary to the Columbia River, Washington State
Date Submitted:	November 25, 2002
Date Last Updated:	August, 2005

SECTION 1. GENERAL PROGRAM DESCRIPTION

1.1) Name of hatchery or program.
Winthrop National Fish Hatchery (WNFH)

1.2) Species and population (or stock) under propagation, and ESA status.
Carson NFH/Methow Composite stock of spring Chinook salmon *(Oncorhynchus tshawytscha)*, listed.

1.3) Responsible organization and individuals

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Other agencies, Tribes, co-operators, or organizations involved, including contractors, and extent of involvement in the program:
Involved parties include those associated with the Columbia River Fish Management Plan and the *U.S. v. Oregon* court decision.

1.4) Funding source, staffing level, and annual hatchery program operational costs.
Winthrop NFH is funded by the Bureau of Reclamation (BOR) at about $284,000 annually, and is staffed by 5 FTE's. Fish marking, evaluation, and fish health programs are not included in the above operational costs. Other USFWS offices, funded by the BOR, conduct these programs.

1.5) Location(s) of hatchery and associated facilities.
Winthrop NFH is part of the Leavenworth Complex, which also includes Leavenworth and Entiat NFH's. Winthrop NFH is located about ½ mile west of Winthrop, WA on the Methow River, 50.4 river miles (rm) above its confluence with the Columbia River. Fish returning to WNFH must travel about 524 Columbia rms and negotiate passage through nine Columbia River hydroelectric dams.

1.6) Type of program.
Mitigation

1.7) Purpose (Goal) of program.
The original purpose of this program was to mitigate for Grand Coulee Dam. When UCR spring Chinook salmon were listed in 1999, the decision was made to switch from the non-indigenous, non-listed Carson NFH stock, to the listed Methow Composite stock. Therefore, the goal of the program has changed from providing harvest to one of recovery of the listed stock.

1.8) Justification for the program.
The hatchery was originally authorized through the Grand Coulee Fish Maintenance Project in 1937 and again by the Mitchell Act in 1938. Winthrop NFH is one of three mid-Columbia hatcheries constructed by the BOR as mitigation for the Grand Coulee Dam-Columbia Basin Project. The current goal of the program is the restoration of the listed Methow River stock, while maintaining its mitigation responsibilities.

1.9, 1.10) List of program "Performance Standards and Indicators".
Performance Indicators are designated as "Risk assessment" (R) or "Benefits" (B).

Legal Mandates:
Performance Standard (1): Program contributes to mitigation requirements as stated in the Columbia River Fish Management Plan and the *U.S. v. Oregon* decision.

> *Indicator (a):* **(B)** Number of fish released by program, returning, or caught, as applicable to given mitigation requirements.

Performance Standard (2): Program addresses ESA responsibilities.

> *Indicator (a):* **(R)** ESA consultations under Section 7 and 10 have been completed. A Biological Opinion (Permit # 1300) has been issued to the facility. Modifications to existing BA's are done in a timely manner.

Harvest:
Performance Standard (3): Release groups are sufficiently marked in a manner consistent with information needs and protocols to enable determination of impacts to natural- and hatchery-origin fish in fisheries.

> *Indicator (a):* **(R)** Marking rate by mark type for each release group.

> *Indicator (b):* **(R)** Sampling rate by mark type for each fishery.

> *Indicator (c):* **(R)** Number of marks of this program observed in fishery samples, and estimated total contribution of this population to fisheries, by fishery.

Conservation of Wild/Naturally Spawning Populations:
Performance Standard (4): Artificial propagation program contributes to an increasing number of spawners returning to natural spawning areas.

> *Indicator (a):* **(B)** Annual number of spawners on spawning grounds, by age.

Indicator (b): **(B)** Spawner-recruit ratios.

Indicator (c): **(B)** Annual number of redds in selected natural production index areas.

Performance Standard (5): Releases are sufficiently marked to allow statistically significant evaluation of program contribution to natural production, and to evaluate effects of the program on the local natural population.

Indicator (a): **(R)** Marking rates and type of mark.

Indicator (b): **(R)** Number of marks and estimated total proportion of this population in juvenile dispersal and in adults on natural spawning grounds.

Life History Characteristics:

Performance Standard (6): Fish collected for broodstock are taken throughout the return or spawning period in proportions approximating the timing and age distribution of the population from which broodstock is taken.

Indicator (a): **(R)** Temporal distribution of broodstock collection, and of naturally produced population at point of collection.

Indicator (b): **(R)** Age composition of broodstock collected, and of naturally produced population at point of collection.

Performance Standard (7): Broodstock collection does not significantly reduce potential production in natural rearing areas.

Indicator (a): **(R)** Number of spawners of natural origin removed for broodstock.

Indicator (b): **(R)** Number and origin of spawners migrating to natural spawning areas.

Indicator (c): **(R)** Number of eggs or juveniles placed in natural rearing areas.

Performance Standard (8): Life history characteristics of the natural population do not change as a result of this artificial production program.

Indicator (a): **(R)** Specific life history characteristics to be measured in the artificially produced population.

Performance Standard (9): Annual release numbers do not exceed estimated basin-wide and local habitat capacity, including spawning, freshwater rearing, migration corridor, and estuarine and near-shore rearing.

Indicator (a): **(R)** Carrying capacity criteria for basin-wide and local habitat, including method of calculation.

Indicator (b): **(R)** Annual release numbers from all programs in basin and subbasin, including size and life-stage at release, and length of acclimation, by program.

Indicator (c): **(R)** Location of releases and natural rearing areas.

Indicator (d): **(R)** Timing of hatchery releases, compared to natural populations.

Genetic Characteristics:
Performance Standard (10): Patterns of genetic variation within and among natural populations do not change significantly as a result of artificial production.

Indicator (a): **(R)** Genetic profiles of naturally produced adults, as developed at program's onset and compared to genetic profiles developed each generation.

Performance Standard (11): Collection of broodstock does not adversely impact the genetic diversity of the naturally spawning population.

Indicator (a): **(R)** Total number of natural spawners reaching the collection facility.

Indicator (b): **(R)** Total number of spawners estimated to pass the collection facility to spawning areas, compared to minimum effective population size required for those natural populations.

Indicator (c): **(R)** Timing of collection compared to overall run timing.

Performance Standard (12): Juveniles are released on-station, or after sufficient acclimation to maximize homing ability to intended return locations.

Indicator (a): **(R)** Location of juvenile releases.

Indicator (b): **(R)** Length of acclimation period.

Indicator (c): **(R)** Release type, whether forced, volitional, or direct stream release.

Indicator (d): **(R)** Proportion of adult returns to program's intended return location, compared to returns to unintended dams, fisheries, and artificial or natural production areas.

Performance Standard (13): Juveniles are released at fully smolted stage.

Indicator (a): **(R)** Level of smoltification at release, compared to a regional smoltification index (when developed). Release type, whether forced, volitional, or direct stream release.

Research Activities:
Performance Standard (14): The artificial production program uses standard scientific

procedures to evaluate various aspects of artificial propagation.

Indicator (a): **(R)** Scientifically based experimental design, with measurable objectives and hypotheses.

Performance Standard (15): The artificial propagation program is monitored and evaluated on an appropriate schedule and scale to address progress toward achieving the experimental objective and evaluate beneficial and adverse effects on natural populations.

Indicator (a): **(R)** Monitoring and evaluation framework including detailed time line.

Indicator (b): **(R)** Annual and final reports.

Operation of Artificial Production Facilities:

Performance Standard (16): Artificial production facilities are operated in compliance with all applicable fish health guidelines and facility operation standards and protocols such as those described by IHOT, PNFHPC, the co-managers of Washington Fish Health Policy, INAD, and MDFWP.

Indicator (a): **(R)** Annual reports indicating level of compliance with applicable standards and criteria.

Performance Standard (17): Effluent from artificial production facility will not detrimentally affect natural populations.

Indicator (a): **(R)** Discharged water quality compared to applicable water quality standards and guidelines, such as those described or required by NPDES, IHOT, PNFHPC, and Co-managers of Washington Fish Health Policy tribal water quality plans, including those relating to temperature, nutrient loading, chemicals, etc.

Performance Standard (18): Water withdrawals and instream water diversion structures for artificial production facility operation will not prevent access to natural spawning areas, affect spawning behavior of natural populations, or impact juvenile rearing environment.

Indicator (a): **(R)** Water withdrawals compared to applicable passage criteria.

Indicator (b): **(R)** Water withdrawals compared to NMFS, USFWS, and WDFW juvenile screening criteria.

Indicator (c): **(R)** Number of adult fish aggregating and/or spawning immediately below water intake point.

Indicator (d): **(R)** Number of adult fish passing water intake point.

Indicator (e): **(R)** Proportion of diversion of total stream flow between intake and outfall.

Performance Standard (19): Releases do not introduce pathogens not already existing in the local populations, and do not significantly increase the levels of existing pathogens.

> *Indicator (a):* **(R)** Certification of juvenile fish health immediately prior to release, including pathogens present and their virulence.
>
> *Indicator (b):* **(R)** Juvenile densities during artificial rearing.

Performance Standard (20): Any distribution of carcasses or other products for nutrient enhancement is accomplished in compliance with appropriate disease control regulations and guidelines, including state, tribal, and federal carcass distribution guidelines.

> *Indicator (a):* **(B)** Number and locations of carcasses or other products distributed for nutrient enrichment.
>
> *Indicator (b):* **(R)** Statement of compliance with applicable regulations and guidelines.

Performance Standard (21): Adult broodstock collection operation does not significantly alter spatial and temporal distribution of any naturally produced population.

> *Indicator (a):* **(R)** Spatial and temporal spawning distribution of natural population above and below weir/trap, currently and compared to historic distribution.

Performance Standard (22): Weir/trap operations do not result in significant stress, injury, or mortality in natural populations.

> *Indicator (a):* **(R)** Mortality rates in trap.
>
> *Indicator (b):* **(R)** Prespawning mortality rates of trapped fish in hatchery or after release.

Performance Standard (23): Predation by artificially produced fish on naturally produced fish does not significantly reduce numbers of natural fish.

> *Indicator (a):* **(R)** Size at, and time of, release of juvenile fish, compared to size and timing of natural fish present.

1.11) Expected size of program.

1.11.1) Proposed annual broodstock collection level (maximum number of adult fish). Approximately 360 adults are needed for the production of 600,000 juveniles.

1.11.2) Proposed annual fish release levels (maximum number) by life stage and location.

Table 1. Current proposed annual release numbers for SCS at Winthrop NFH.

Life Stage	Release Location	Annual Release Level
Eyed Eggs		
Unfed Fry		
Fry		
Fingerling		
Yearling	Methow River	600,000

1.12) Current program performance, including estimated smolt-to-adult survival rates, adult production levels, and escapement levels. Indicate the source of these data.

Table 2. Number of yearling SCS released, adult returns by broodyear, and corresponding smolt to adult survival (%) from Winthrop NFH, 1980 to 1994 (USFWS 2002).

Brood year	Smolts released	Adult returns (BY)	Smolt to adult survival (%)
1980	712,700	1,175	0.165
1981	953,508	1,028	0.108
1982	985,081	877	0.089
1983	1,167,625	1,031	0.088
1984	1,062,794	736	0.069
1985	1,069,293	163	0.015
1986	1,090,200	90	0.008
1987	865,734	117	0.014
1988	1,121,395	703	0.063
1989	1,055,056	288	0.027
1990	624,771	11	0.002
1991	950,624	21	0.002
1992	556,313	202	0.036
1993	770,847	370	0.048
1994	112,395	80	0.071

1.13) Date program started (years in operation), or is expected to start.

The current SCS program began in 1974. The phasing-out of the Carson stock began in 1999 and production of the listed Methow Composite stock began.

1.14) Expected duration of program.

Ongoing

1.15) Watersheds targeted by program.

Methow River Basin (WRIA 48). Returning adults of WNFH origin are expected to return to the Methow Basin only, although some are harvested in lower Columbia and ocean fisheries.

1.16) Indicate alternative actions considered for attaining program goals, and reasons why those actions are not being proposed.

1.16.1 Brief Overview of Key Issues

A portion of the issues stated below were presented by entities other than the USFWS, and therefore are not necessarily the opinion of the management entity.

Since the ESA listing of spring Chinook salmon in 1999, the goals/objectives of this facility have changed. The initial goal was to provide harvest, while the current goal is to aid in the recovery of listed spring Chinook in this ESU. Prior to 1999, the spring Chinook salmon stock propagated at this hatchery was derived from a lower Columbia River stock (Carson NFH). This stock was not listed under the ESA, and therefore the decision was made to "phase-out" this stock in favor of the more endemic, listed Methow Composite stock. The last release of "pure" Carson NFH stock was in 2000 (BY 1998).

Two salmon hatcheries operate in the Methow Basin, Methow State Hatchery and Winthrop NFH. Both were built for mitigation purposes, but with totally different objectives. A key issue is that there is not a cohesive operation plan for the two facilities, and that plans change annually based on broodstock estimates. Another issue raised is the stocking rate for the Methow Basin; whether it is being over-stocked. Also, WNFH lacks the ability to collect natural-origin adults (NOR) for incorporation into their broodstock. Winthrop NFH also lacks acclimation ponds to ensure that adults do not return to the hatchery and adequately distribute themselves on the spawning grounds.

1.16.2 Potential Alternatives to the Current Program

The potential alternatives presented are in draft form and are not necessarily endorsed by the management entity, as mitigation responsibilities may override the desire to implement the alternative.

Alternative 1: <u>Incorporate NOR adults into the hatchery broodstock by collecting adults from tributary traps.</u>
Current brood for the program is composed entirely of adults volunteering to the facility. Adults in excess of brood needs are left in the river to spawn naturally. By incorporating NOR adults into the program, successful spawning in the natural environment by these excess adults may increase substantially.

Alternative 2: <u>Determine if production capacities of the Methow SH and Winthrop NFH are surplus to the needs of the Methow Basin and therefore capable of supplying Methow Composite stock for reintroduction into Omak Creek as an "experimental population".</u> The Colville Tribes will be submitting a comprehensive HGMP for spring Chinook in the Okanogan River. An Integrated Recovery Program will be included in the HGMP to re-establish naturally spawning populations in historical habitats. This program has been initiated in Omak Creek using Carson stock (50,000 smolts annually). However, the HGMP will describe the need to switch to the most local broodstock (Methow Composite) when available. Planning for reintroduction of spring Chinook has also been initiated in Canadian waters. Methow Composite stock may also be the best for re-establishing naturally spawning populations there as well.

Should investigations in the Methow basin indicate that the current production program is excessive to conservation purposes, then about 50,000 smolts should be made available to the Colville Tribes for rearing and acclimation in an existing facility on Omak Creek. This would need to be accompanied with a suitable determination by NOAA that these ESA-listed fish and any resulting naturally spawning Chinook would be an experimental population. This action would provide the greatest probability of re-establishing a naturally spawning spring Chinook population in the Okanogan basin and increase the likelihood of down-listing or delisting the Upper Columbia River Spring Chinook ESU by increasing its abundance, distribution, and diversity.

Alternative 3: Expand annual egg take of Methow Composite stock at Methow SH and Winthrop NFH for rearing and stocking into the Okanogan Basin. If all of the existing rearing capacity of the two hatcheries is deemed necessary to support an Integrated Recovery Program in the Methow Basin (Alternative 2 is not feasible), then the program should be managed to increase its egg take. Initially, sufficient extra eggs should be taken to support a 50,000 smolt release program in Omak Creek. This program would replace the current Carson-stock releases, provided NOAA would designate the listed fish in the Okanogan Basin as an experimental population. In the longer-term, these eggs would be hatched and juveniles reared at the anticipated Chief Joseph Dam Hatchery (now in conceptual design). In the interim, this production could likely be reared at Willard NFH or another lower river hatchery.

1.16.3 Potential Reforms and Investments

The potential reforms and investments stated below are in draft form, presented for further discussion, and do not represent final decisions by the management entities.

Reform/Investment 1: Determine if the Methow Basin is being over-stocked with spring Chinook salmon given the low abundance of wild fish.
The current stocking rate/goal for spring Chinook salmon in the Methow Basin is set at 1.15 million smolts annually. It is currently unknown if this number exceeds the capacity of the Methow Basin. This action, if stocking numbers are determined to be too high and subsequently lowered, would reduce risks and improve survival of listed spring Chinook salmon in this basin. Estimated costs are in the range $.

Reform/Investment 2: Develop one, cohesive Management Plan to cover Methow SH and Winthrop NFH's production programs. Methow SH is located about ¼ mile upstream of Winthrop NFH. Although both facilities raise listed spring Chinook and were built for mitigation purposes, they have very different operating standards and authorizations. This situation has caused conflict between the hatcheries and with other co-managers and agencies. Estimated costs are in the range $.

Reform/Investment 3: Construct additional acclimation sites in the upper Methow River. The current program at Winthrop NFH utilizes adults that volunteer to the hatchery's collection ladder. This approach has been called “concrete to concrete”. The ESA-listed spring Chinook salmon program at Winthrop NFH is still new, but there are concerns over using strictly hatchery returns for supplementation and recovery purposes. Part or all of the listed juvenile spring Chinook production could be transferred to this/these proposed sites for acclimation and volitional release. The resulting adults would then spawn with naturally produced adults. This action would potentially increase the natural abundance of spring Chinook (i.e., supplementation) while reducing the risks of domestication involved in a “concrete to concrete” hatchery program. Estimated costs are in range $$$$$. Also, please see Reform/Investment #4.

Reform/Investment 4: <u>Construct or redesign adult collection facility/facilities near the upriver acclimation site/sites.</u> In order for acclimation sites to be most useful, there must be a method to capture returning adults from the natural environment. Again, a major issue at this facility, is the inability to incorporate NOR adults into the broodstock. A collection facility would alleviate this problem while reducing risks and improving survival of listed spring Chinook in this basin. Estimated costs are in the range $$$$$.

Reform/Investment 5: <u>Provide 50,000 surplus Methow Composite spring Chinook for acclimation in Omak Creek should surplus production be determined in the Methow Basin.</u> Acclimation facilities already exist and the M&E for such a program can be integrated in the already BPA-approved Okanogan Basin M&E Project.
Cost: <$50,000. The only costs would be for O&M of the spring Chinook during acclimation. Depending on program success, broodstock collection at the anticipated Omak weir would be appropriate.

Reform/Investment 6: <u>Support the transportation and rearing expenses for 50,000 smolts</u>. If Alternative 5 were implemented, costs would increase to include the transportation and rearing of the 50,000 smolts. Costs: <$50,000. The rearing of these fish would be accomplished at a new or existing hatchery facility. No capital costs are anticipated, only O&M.

For reference:

$	<$50,000
$$	$50,000 to $99,000
$$$	$100,000 to $499,000
$$$$	$500,000 to $999,000
$$$$$	$1,000,000 to $4,999,000
$$$$$$	$5,000,000 and over

<u>SECTION 2. PROGRAM EFFECTS ON NMFS ESA-LISTED SALMONID POPULATIONS</u>. (USFWS ESA-Listed Salmonid Species and Non-Salmonid Species are addressed in Addendum A)

2.1) List all ESA permits or authorizations in hand for the hatchery program.
USFWS # 1-9-99-I-112 (bull trout).
NMFS # 1118 (steelhead and spring Chinook).

NMFS # 1300 (extension of # 1118).
NMFS # 1119 (research).

2.2) Provide descriptions, status, and projected take actions and levels for NMFS ESA-listed natural populations in the target area.

2.2.1) Description of NMFS ESA-listed salmonid population(s) affected by the program.

Spring Chinook salmon (SCS)
Adult spring Chinook destined for the upper-Columbia Basin enter the Columbia River beginning in March and reach peak abundance (in lower river) in April and early May (Chapman et al. 1995). Spring Chinook enter the mainstem portions of tributaries from late-April to July. Spawning occurs from late-July through September, usually peaking in mid to late August (Chapman et al. 1995).

Data from post-spawn adults collected and sampled in mid-Columbia tributaries, 1986 to 1993, shows that on average, 5% of males return at age 3, 58% at age 4, and 37% at age5. Female averages are 58% at age 4, and 42% return at age 5 (Chapman et al. 1995).
On the spawning grounds, Chapman et al. 1995, indicated that females may dominate the males in numbers, but state that the ratio may be closer to 1:1. This is because there is a greater likelihood of recovering females on the spawning grounds than males (Chapman et al. 1994).

Wild juvenile spring Chinook salmon originating in the upper-Columbia Basin emigrate towards the ocean during their second year. Average size at emigration (April and May) ranges from about 91.8mm to 100.5mm (averages from three emigration studies) (Chapman et al. 1995).

From 1985 to 1993, the average 10th, 50th, and 90th percentile passage at Rock Island Dam was April 21st, May 10th, and June 3rd respectively (Chapman et al, 1995). Although these percentages are strongly influenced by releases from Leavenworth NFH, Chapman et al. (1995) believe that the naturally produced migrants have a run timing similar to the hatchery component.

Summer Steelhead (SST)
Steelhead destined for the upper-Columbia region enter the Columbia River between May and September (WDF et al. 1990). They pass Rock Island Dam from July through the following May. All steelhead spawn in the spring regardless of when they enter the Columbia River.

Spawning grounds are not surveyed for steelhead because the adults generally spawn over a 4 to 5 month period coinciding with the spring run-off when water visibility is low and discharge high (Chapman et al. 1994). Spawning is believed to take place between March and June, but has been observed as late as July (Chapman et al. 1994).

Females make up about 65% of adults sampled at Wells Dam; of smolts sampled at Rock

Island Dam in 1988, 63% were female (Chapman et al. 1994).

Howell et al. (1985) reported age estimates from creel surveys in the Wenatchee River from the late 1970s to the early 1980s. Scale samples from these surveys were used for age determination. In the Wenatchee River, they report naturally produced steelhead of five different age classes (2.1, 2.2, 2.3, 3.1, and 3.2), with the largest percentage in the 2.1 class. The "European Method" was used for age determination where the first digit represents the number of winters spent in freshwater, and the second digit indicates the number of winters in saltwater.

Migrating steelhead smolts captured at Rock Island Dam average 163 to 188 mm. Adults returning after one year average 59 to 64 cm, whereas those spending two years at sea average 67 to 76 cm when returning to freshwater. Between 1986 and 1993, wild adults of both sexes combined, averaged 66.5 cm (Chapman et al. 1994).

- **Identify the NMFS ESA-listed population(s) that will be <u>directly</u> affected by the program.**

Methow Basin SCS.

Although UCR summer steelhead are reared at WNFH, and their program does have a direct effect on this stock, that program will be addressed in a separate HGMP.

- Identify the NMFS ESA-listed population(s) that may be <u>incidentally</u> affected by the program.

UCR steelhead and Methow Basin SCS.

2.2.2) <u>Status of NMFS ESA-listed salmonid population(s) affected by the program.</u>

- Describe the status of the listed natural population(s) relative to "critical" and "viable" population thresholds.

NMFS determined that the annual rate of population change for the UCR spring Chinook and summer steelhead ESU is less than 0.9, and decreasing in abundance at a rate of at least 10% per year. These populations are at dire risk, with only small fractions of their already depressed populations expected to persist through the next 24 years under current conditions (NMFS 2001). Therefore, UCR spring Chinook and summer steelhead are considered at a "critical population threshold."

- **Provide the most recent 12 year (e.g. 1988-present) progeny-to-parent ratios, survival data by life-stage, or other measures of productivity for the listed population. Indicate the source of these data.**

See below

- Provide the most recent 12 year (e.g. 1988-1999) annual spawning abundance estimates, or any other abundance information. Indicate the source of these data.

Table 3. Number of SCS redds found in the Methow River Basin, 1988 – 1999 (J. Hubble, pers. comm. 2002).

Year	# of Redds	Year	# of Redds
1988	733	1994	133
1989	517	1995	15
1990	498	1996	Na
1991	250	1997	150
1992	738	1998	Na
1993	617	1999	36

Note: Years 1996 and 1998, all ascending SCS adults were captured at Wells Dam and transferred to Methow SFH and Winthrop NFH.

- **Provide the most recent 12 year (e.g. 1988-1999) estimates of annual proportions of direct hatchery-origin and listed natural-origin fish on natural spawning grounds, if known.**

Table 4. Estimates of natural-origin SCS returning to the Methow River, 1988 – 1999 (J. Hubble, pers. comm. 2002).

Year	Total Adults	# of Natural Origin Adults	Year	Total Adults	# of Natural Origin Adults
1988	2,940	1,613	1994	258	195
1989	1,720	1,525	1995	113	99
1990	939	818	1996	461	0
1991	782	690	1997	1,004	461
1992	1,623	1,232	1998	430	11
1993	2,444	1,546	1999	649	272

2.2.3) <u>Describe hatchery activities, including associated monitoring and evaluation and research programs, that may lead to the take of NMFS listed fish in the target area, and provide estimated annual levels of take</u>

- Describe hatchery activities that may lead to the take of listed salmonid populations in the target area, including how, where, and when the takes may occur, the risk potential for their occurrence, and the likely effects of the take.
Since only listed SCS are used for production, a yearly “take” of about 360 adults will occur. After brood has been secured, the remaining adults will be released back into the Methow River.

- Provide information regarding past takes associated with the hatchery program, (if known) including numbers taken, and observed injury or mortality levels for listed fish.
Please see above

- Provide projected annual take levels for listed fish by life stage (juvenile and adult)

quantified (to the extent feasible) by the type of take resulting from the hatchery program (e.g. capture, handling, tagging, injury, or lethal take).
See Table 1 in appendix and above.

- Indicate contingency plans for addressing situations where take levels within a given year have exceeded, or are projected to exceed, take levels described in this plan for the program.
All juveniles released from WNFH are marked. Therefore, all returning adults will also be marked. All captured adults that are in excess of brood needs, will be returned to the river for natural spawning.

SECTION 3. RELATIONSHIP OF PROGRAM TO OTHER MANAGEMENT OBJECTIVES

3.1) Describe alignment of the hatchery program with any ESU-wide hatchery plan (e.g. *Hood Canal Summer Chum Conservation Initiative*) or other regionally accepted policies (e.g. the NPPC *Annual Production Review* Report and Recommendations - NPPC document 99-15). Explain any proposed deviations from the plan or policies.
The Columbia River Fish Management Plan *(US v. Oregon)* directs the operation/production of this facility.

3.2) List all existing cooperative agreements, memoranda of understanding, memoranda of agreement, or other management plans or court orders under which program operates.
Original Authorities

- Grand Coulee Dam Project, 49 Stat. 1028, 08/30/1935
- Grand Coulee Fish Maintenance Project, 04/03/1937
- Mitchell Act, 52 Stat. 345, 05/11/1938
- Columbia Basin Project Act, 57 Stat. 14, 03/10/1943
- Mitchell Act (amended), 60 Stat. 923, 08/14/1946
- Fish and Wildlife Coordination Act, 60 Stat. 1080, 08/14/1946

Description of Roles/Responsibilities/Authorities Beyond Those Initially Authorized

- Treaty with the Walla Walla, Cayuse, Umatilla Tribes, 06/09/1855
- Treaty with the Yakama, 06/09/1855
- Treaty with the Nez Perce, 06/11/1855
- Treaty with the Tribes of Middle Oregon, 06/25/1855
- Executive Order (Treaty with Bands of Colville), 04/08/1872
- U.S. v. Oregon (Sohappy v. Smith, “Belloni decision”, Case 899), 07/08/1969
- Endangered Species Act of 1973, 87 Stat.884, 12/28/1973
- Salmon and Steelhead Conservation and Enhancement Act, 94 Stat. 3299, 12/22/1980
- Pacific Salmon Treaty Act of 1985 (U.S./Canada Pacific Salmon Treaty), Public Law 99-5, 16 U.S.C. 3631, 03/15/1985

3.3) Relationship to harvest objectives.

Since this program now focuses on propagating a listed stock to aid in the recovery of that stock, few, if any are expected to be harvested as no listed fish has an adipose fin-clip.

3.3.1) Describe fisheries benefiting from the program, and indicate harvest levels and rates for program-origin fish for the last twelve years (1988-99), if available.

<u>Fisheries that benefit from the program (in past years):</u>

- Marine sport and commercial
- Columbia River gill net and freshwater net
- Columbia River and freshwater sport
- Treaty ceremonial and tribal harvest

Harvest rates for spring Chinook salmon, in general, are low. Very few adults of WNFH origin are harvested, especially due to the listing of spring Chinook as endangered. To achieve the current recovery role of this facility, it is preferred that returning adults are not harvested.

3.4) Relationship to habitat protection and recovery strategies.

As previously mentioned, WNFH is a mitigation facility constructed to compensate for the loss of spawning and rearing habitat due to the construction of Grand Coulee Dam.

The following was taken directly from the Draft Methow Basin Subbasin summary (CBFWA 2002).

A central limitation to building self-sustaining populations of anadromous fish in the Methow Subbasin is the high smolt and adult mortalities incurred at the nine hydropower facilities that lie downstream from the Methow's confluence with the Columbia River. These mortalities severely reduce the number of naturally produced adults that return to spawn and reseed available habitat within the Methow Subbasin.

Within the Methow Subbasin, habitat types, habitat conditions, and land uses vary primarily according to topography, climate, relative ease of access, and duration of human activity. Extreme winter temperatures, particularly in the watershed's upper reaches, play an important role in limiting potential salmonid productivity within the basin.

Over the course of the last century, a number of human induced physical changes have redefined the quality and quantity and terrestrial habitat found in the mid and lower reaches of the Methow Subbasin. Most significant among these changes is habitat fragmentation compounded by degradation in overall habitat quality; the result of historic and current agricultural practices, timber management, mismanaged grazing, mining, and commercial and residential development activities.

An additional crucial factor affecting habitat quality in the Methow Subbasin is water quantity. Numerous streams and creeks throughout the Methow watershed are prone to naturally occurring seasonal low flows and occasional dewatering. Those natural flows and instances of dewatering have been compounded in some cases by irrigation withdrawals and by agricultural water use inefficiencies in some Methow tributaries.

3.5) Ecological interactions. [Please review Addendum A before completing this section. If it is necessary to complete Addendum A, then limit this section to NMFS jurisdictional species. Otherwise complete this section as is.]

Table 5. Expected fish species present in Methow River

Salmonid Species	Scientific Name	Non-salmonid Species	Scientific Name
Spring Chinook salmon	*Oncorhynchus tshawytscha*	Longnose dace	*Rhinichthys cataractae*
Summer Chinook salmon	*O. tshawytscha*	Mottled sculpin	*Cottus bairdi*
Sockeye salmon	*O. nerka*	Largescale sucker	*Catostomus macrocheilus*
Coho salmon	*O. kisutch*	Bridgelip sucker	*C. columbianus*
Summer steelhead	*O. mykiss*	Pacific lamprey	*Entosphenus tridentatus*
Westslope cutthroat trout	*O. clarki lewisi*	Northern pikeminnow	*Ptychocheilus oregonensis*
Redband trout	*O. mykiss gairdneri*	Redside shiner	*Richardsonius balteatus*
Bull trout	*Salvelinus confluentus*		
Brook trout	*S. fontinalis*		
Mountain whitefish	*Prosopium williamsoni*		

Ecological effects/interactions of WNFH fish on natural populations is broken-down into two categories; 1) effects associated with juvenile releases, and 2) effects associated with returning adults. Potential effects to listed stocks are described below.

Juvenile Releases
<u>*Competition:*</u>
When hatchery-origin Chinook are released into the Methow River the potential exists for intra- and inter-specific competition with natural-origin juvenile salmonids, including listed spring Chinook salmon and steelhead (NMFS 2001). Listed wild spring Chinook and steelhead are present year-round in Upper Columbia River region tributary and mainstem areas. Spring Chinook fry emerge from the gravel in late winter or early spring at an average size of approximately 30 mm fl, with most fry immediately moving downstream to mainstem tributary areas for rearing (NMFS 2001). Upper Columbia River spring Chinook salmon migrating seaward as yearling fish between April and June, average 87 to 127 mm fl (NMFS 2001). Steelhead fry egress from late spring through August at a size of 30 to 33 mm fl (NMFS 2001). The fry disperse to downstream areas in late summer and fall. Upper Columbia River steelhead emigrate seaward as age 2+ (43.2%) or 3+ (46.4%) smolts (Peven, 1990) during April and May at an average size of 163 to 188 mm (Chapman et al. 1994).

For the species viewed as posing competition risks by SIWG (1984), spring Chinook, summer Chinook, and coho salmon yearling smolts released from the hatcheries by the action agencies (which includes WNFH) in April and May likely encounter newly emerged, listed spring Chinook salmon fry adjacent to the hatchery release sites. These release groups may also encounter spring Chinook fry and juvenile steelhead in river reaches downstream of the release sites. Emigrating spring Chinook and steelhead smolts in the action area may also be encountered during the hatchery fish emigration period. The SIWG (1984) identified a high risk that competition by hatchery-origin Chinook and coho salmon juveniles will have a significant negative impact on productivity of wild Chinook salmon and Steelhead juveniles in freshwater.

The release of migration-ready smolts limits the duration of interaction between the hatchery fish and listed wild spring Chinook and steelhead rearing in areas adjacent to, and downstream of, the hatchery fish release locations. This release practice therefore likely decreases resource competition and behavioral dominance risks posed by the larger hatchery fish. The larger size of the hatchery fish relative to the wild fry and fingerlings present at the time of releases also decreases the likelihood for competition for the same food resources by the hatchery and wild fish. The larger, seaward migrating hatchery smolts will also tend to use different habitat than rearing steelhead and spring Chinook fry and fingerlings that may be encountered (NMFS 2001).

Predation:
By virtue of their large size compared to wild juvenile fish that they may encounter after release, and considering the areas where hatchery fish are released, hatchery spring Chinook yearlings have the potential to prey upon listed fish in the Methow River and mainstem Columbia River (NMFS 2001). The SIWG (1984) identified that the release of hatchery Chinook and coho salmon would adversely affect the productivity of wild Chinook and steelhead populations through predation, but to what extent is unknown.

Spring Chinook yearling smolts released from WNFH in April have the potential to encounter newly emerged, listed spring Chinook fry in the mid- to lower Methow River that have emigrated downstream from natural spawning areas above the hatchery. The hatchery smolts may also encounter rearing spring Chinook fry and fingerlings, and yearling steelhead fingerlings, downstream of the release site in the mainstem Columbia River. The later emergence time for steelhead fry in the Methow River Basin likely separates the fry temporally from the hatchery salmon releases, making predation unlikely (NMFS 2001). Applying the "1/3 size rule" (USFWS 1994), and considering hatchery release timing relative to the presence and life history stage of listed fish that may be encountered, WNFH yearling spring Chinook salmon may pose an elevated risk of predation to newly emerged wild spring Chinook fry (NMFS 2001).

Hatchery spring Chinook released at WNFH in April may encounter emigrating spring Chinook and steelhead smolts in the action area during the hatchery fish release and downstream migration period. Predation by hatchery fish on listed spring Chinook and steelhead smolts commingling with hatchery fish during seaward emigration is unlikely, given the similar size of hatchery salmon and wild spring Chinook, and the generally larger size of emigrating wild steelhead smolts (NMFS 2001). The hatchery releases may pose indirect predation risks to the wild fish in Basin reaches where hatchery fish are densely distributed and commingled with wild fish, however, by attracting avian or fish predators (NMFS 2001).

Residualism:
Spring Chinook, summer Chinook, sockeye, and coho salmon released from hatcheries as yearling smolts do not have the same potential to residualize as steelhead (NMFS 2001). Standardization of the life history of these salmon species by producing yearling smolts differs from the variability in growth and advent of smoltification evident in wild fish populations. The hatchery production strategies designed to release uniform sized smolt groups limit the likelihood for residualization of the salmon released (NMFS 2001).

Residualization by WNFH yearling spring Chinook salmon, leading to the occurrence of precocious male spring Chinook, may be a risk factor for listed wild adult spring Chinook in the Methow River Basin (NMFS 2001). The existence of non-migrating, precocious males is common and characteristic of hatchery and wild spring Chinook stocks in the region at low proportions (1% to 3% of yearling populations) (USFWS 1999). These precocious fish may contribute to reproduction in natural spring Chinook spawning areas, but the extent of any contribution is unknown. The risk of adverse effects may be reduced by an apparent higher mortality rate for these precocious fish relative to non-maturing juvenile fish, and a low stray rate to areas outside of the hatchery release location (NMFS 2001).

Transmission of Disease or Parasites:
The potential for WNFH fish to transmit diseases and parasites to listed salmonids is unknown, but thought to be low. Service fish health biologists routinely assess the health of spring Chinook propagated at WNFH. At least once per month, biologists sub-sample ponds to determine Bacterial Kidney Disease (BKD) levels, overall fish health, parasites, and the possible occurrence of other viral or bacterial infections. Under Service fish health policy, fish at WNFH must be destroyed and their remains buried if they are diagnosed with viral diseases not endemic to the country or that threaten the continued existence of fish populations. Parasites are not prevalent among WNFH fish. Female adults are tested for levels of *Renebacterium salmoninarum* at spawning time, using the Enzyme-linked Immuno-assay (ELISA) method, and eggs from females with high levels of BKD are discarded or out-planted as eyed eggs or fry.

Migration Corridor:
Unlisted hatchery salmon smolts released from the Upper Columbia River hatcheries may encounter listed Columbia and Snake river basin salmon and steelhead juveniles during migration in the mainstem Columbia River and the estuary (NMFS 2001). Spatial and temporal interaction between hatchery-released smolts and listed salmon and steelhead juveniles may lead to several types of adverse affects on the listed natural populations: predation, competition, behavioral alteration, and disease transmittal.

There is likely a low risk of predation by Upper Columbia River hatchery Chinook smolts on listed Chinook salmon, sockeye, and steelhead juveniles due to low spatial and temporal overlap with fish of a susceptible size in the migration corridor. Listed Lower Columbia River chum salmon may be susceptible to predation by yearling Chinook salmon in the lower Columbia River and estuary (NMFS 2001). SIWG (1984) indicated a high risk that predation by this species (and others) would have negative effects on the productivity of chum salmon. Chums are thought to emigrate predominately in March, which may separate them from Upper Columbia region hatchery Chinook, which are released in April. The duration of time that chum salmon inhabit the Columbia River estuary is unknown, as is the risk of predation on the commingled wild fish (NMFS 2001).

Potential impacts of competition on listed fish in the migration corridor likely diminish as hatchery smolts disperse from the hatchery release locations and become less concentrated. Food resource competition may continue to occur at an unknown, but likely lower level as smolts move downstream through the migration corridor (NMFS 2001). NMFS (1996) previously determined that no adverse competition effects on co-occurring listed salmon in the migration corridor would result from the release of hatchery smolts that begin migration immediately seaward after release. The release of migration-ready smolts limits the duration of interaction with wild salmonids in the migration corridor.

Release of only smolts from WNFH will minimize temporal overlap between hatchery-released salmon and listed natural fish in the Columbia River mainstem. Releases of hatchery salmon smolts coincident with managed releases of water from dams (water budget releases) will help accelerate migration of hatchery-released salmon, further reducing spatial and temporal overlaps with wild fish (NMFS 2001).

Additional compliance with fish disease control and minimization policies and guidelines (IHOT 1995), significantly decreases the likelihood for transfer of disease from hatchery salmon to listed wild salmonids during the seaward emigration period in the mainstem river (NMFS 2001).

Returning Adults

The possibility is thought to be low that adult spring Chinook salmon returning to WNFH will adversely impact listed “wild” salmonids. WNFH utilizes a listed hatchery stock and few “wild” adults are used in production. Potential for effect could occur in the ocean and in-river migration corridor or during broodstock collection, harvest, or straying of WNFH adults into the natural spawning areas.

Ocean Effects:

Little is known about individual stocks of Chinook salmon and steelhead trout between the time they leave the estuary as smolts and return as adults to spawn. Available information is inferred from CWT data taken from fish harvested at sea. These data, however, do not give us insight into fish behavior nor inter-specific interactions among stocks in the ocean. Since spring Chinook are harvested at an extremely low rate, WNFH fish are not an important factor in determining ocean harvest regulations and quotas that could effect listed species.

In-river Effects:

Adults returning to WNFH are trapped as volunteers to the hatchery from late May to mid-July. There is potential that listed natural-origin spring Chinook originating from other portions of the Columbia River Basin may also be trapped at the hatchery as volunteers. Scale and Coded-Wire Tag (CWT) analysis of spring Chinook adults collected at WNFH indicates that very few wild spring Chinook stray into the hatchery.

Harvest:
Adult returns to WNFH have not consistently produced sustainable numbers for any harvest. Any harvest in the Methow Basin exposes listed spring Chinook salmon to take. Listed SCS in the Methow River have restricted (prohibited) any local harvest of returning spring Chinook adults.

Straying and Spawning:
The goal of the current program is to allow excess adults (above production needs) to spawn naturally. Stray data, inferred from CWT's covering the listed MC stock is not yet available.

SECTION 4. WATER SOURCE

4.1) Provide a quantitative and narrative description of the water source (spring, well, surface), water quality profile, and natural limitations to production attributable to the water source.

WNFH has withdrawn up to 75% (up to 50 cfs) of its water supply from the Methow River (Foghorn Dam) and 25% from ground water supply. This figure (50 cfs) represents about 3% of the mean annual discharge of 1,592 cfs (Mullan et al. 1992). Due to fish health considerations, WNFH is reducing its use of Methow River water which should further lessen its impact to UCR spring Chinook. The area affected by this action (from withdrawal to return) is about 2100m in length. Foghorn Dam Fish Ladder and Intake was completed in 1996. The inlet to the intake area has fish exclusion racks designed by NMFS personnel. About ¼ mile below the initial intake on the Foghorn Ditch is the WDFW, Methow Fish Hatchery intake. Below the WDFW hatchery (about 150 yards) on the Foghorn ditch is a gate and fish bypass channel. No screens here, but the gate opens from the bottom of the ditch and the bypass channel spills over a concrete weir. The bypass channel leads back to the Methow River. About ¼ mile below the bypass is the WNFH intake. The intake has a trash rack at the ditch leading to the screen chamber. The screen chamber consists of a 10 ft. diameter rotary screen built and maintained by the WDFW screen shop in Yakima, WA. The WDFW maintenance crew periodically checks to ensure that there are no entryways larger than 3/32" that lead to the hatchery intake pipe. All fish entering the screen chamber are spilled into a concrete trough leading to a bypass channel, which leads back to the Methow River.

Table 6. Winthrop NFH Water Certificates.

Certificate #	Source	Purpose/use	Priority Date	Amount
7209-A	Groundwater. Infiltration gallery and well	Fish propagation	04/06/1967	1500 gpm, 2400 af/yr
7509 - A	Groundwater. Infiltration gallery and well	Fish propagation, operation and maintenance of hatchery	02/17/1971	1500 gpm, 2400 af/yr

3203	Spring Branch Springs	Irrigation with supplemental use for operation of hatchery	07/23/1891	10 cfs
848	Methow River Original Certificate 201, Certificate of Change	Originally for production of hydropower, later changed to fish propagation	01/10/1922 04/20/1942	50 cfs 50 cfs

Water quality data for the Methow River are in Attachment 1.

4.2) Indicate risk aversion measures that will be applied to minimize the likelihood for the take of listed natural fish as a result of hatchery water withdrawal, screening, or effluent discharge.

As stated in the previous section, the intake and water delivery systems are in compliance with NMFS criteria. This, coupled with the fact that the facility complies with NPDES standards, should reduce impacts to listed stocks in the basin.

SECTION 5. FACILITIES

5.1) Broodstock collection facilities (or methods).

Adults that enter WNFH, via the ladder, are held in one 50’ x 100’ concrete pond. Two of these ponds are available, if necessary.

5.2) Fish transportation equipment (description of pen, tank truck, or container used).

When adults are brought to WNFH from other sources, WDFW supplies a fish hauling truck and they have operational responsibilities for the vehicle. The truck is fully equipped for such endeavors.

5.3) Broodstock holding and spawning facilities.

As stated in section 5.1, all adults are held in a 50’ x 100’ pond. Adults are held at a density of one fish per eight cubic-feet of rearing space and a flow of 1 gpm per adult. Pathogen-free well water supplies the pond. The spawning shed sits next to the holding pond. Gametes are placed in “zip-lock” bags (not mixed yet), oxygenated, and placed into coolers with ice. The gametes are then taken inside where they are mixed. No mixing occurs until all coded-wire-tags are de-coded.

5.4) Incubation facilities.

Isolation buckets are used from fertilization to the eyed stage. Flow rates initially, are 1 – 2 gpm and increase to 3 gpm at the eyed stage. The eggs remain in the iso-buckets until eye-up, approximately one-month (450-540 TU’s) after spawning. After the eggs are eyed, they are shocked and hand-picked.

After “picking” concludes and ELISA results are confirmed, the eggs are weighed and sampled. After enumeration, the eyed eggs are placed in Marisource stack-type incubators. Each tray is loaded with the eggs from one female, where water flow is maintained at 3 to 6 gpm. Water source is 100% ground water throughout incubation, and temperatures are constant at

50 to 52° F. Formalin treatments are not necessary during incubation.

5.5) Rearing facilities.
Rearing units include 30 – 8' x 80' raceways, 16 – 12' x 100' raceways, 16 – Foster-Lucas ponds, and 34 starter tanks. Emergence occurs in December and January when fry are moved from the trays to the starter tanks. Total rearing space for the starter tanks is 89 cubic feet and flows are at 15 to 20 gpm. The following May or June, the fry are moved to the raceways.

5.6) Acclimation/release facilities.
River water is introduced at the yearling stage in October or November. Yearlings (smolts) are forced out of the ponds. Dam boards are pulled and the smolts travel through an underground pipe system, which empties at the base of the collection ladder.

5.7) Describe operational difficulties or disasters that led to significant fish mortality.
No major disasters with SCS in the past 10 years. Bird predation and disease problems contributed to significant mortalities prior to 1993. A hole in the bottom of one of the Foster-Lucas ponds was blamed for the loss of about 100,000 fry in 1991.

5.8) Indicate available back-up systems, and risk aversion measures that will be applied, that minimize the likelihood for the take of listed natural fish that may result from equipment failure, water loss, flooding, disease transmission, or other events that could lead to injury or mortality.
The hatchery is staffed full-time, eight hours per day. Two employees live in residential quarters on hatchery grounds. The hatchery has a centrally located low-water alarm, which is connected to an automatic dialer. If the dialer fails, a paging system engages and contacts employees up to five miles away. A low water level switch also triggers a horn alarm to alert employees. If power is lost to the facility, a back-up generator engages automatically to restore power.

SECTION 6. BROODSTOCK ORIGIN AND IDENTITY

Describe the origin and identity of broodstock used in the program, its ESA-listing status, annual collection goals, and relationship to wild fish of the same species/population.

6.1) Source.

Table 7. History of egg source for the current SCS program at WNFH.

Egg Source	Broodyear	Stock Origin
Cowlitz River Hatchery	1974	Cowlitz River
Little White Salmon NFH	74, 75, 78	Little White Salmon River
Carson NFH	76, 77, 79, 81, 85, 86	Commingled-Bonneville Dam
Winthrop NFH (Methow R.)	78, 80 to present	Commingled hatchery stock
Leavenworth NFH	79, 80, 84, 89 - 92	Commingled hatchery stock
Klickitat SFH	1989	Klickitat River
Methow River	1999	Methow River
Methow River (Composite)	2000 - 01	Methow SFH

6.2) Supporting information.

6.2.1) History.

The current SCS program at WNFH started in 1974, with releases in 1976. Since 1974, eggs have been obtained from several lower Columbia River sources as well as from Leavenworth NFH. The Little White Salmon stock started in 1967, when fish of unknown origin returned to the Little White Salmon River. These adults were probably descendants of several different stocks. The Carson NFH stock originated from a collection of commingled adults captured at Bonneville Dam.

6.2.2) Annual size.

Very few natural SCS have previously been incorporated into the WNFH program. The current program, which utilizes the listed Methow Composite stock (MC), will incorporate a small number of "wild" adults into their brood. Exact numbers have yet to be determined, but will probably be few.

6.2.3) Past and proposed level of natural fish in broodstock.

Rarely do ad-present "wild" SCS adults enter the collection ladder at WNFH. Current protocol is to transfer any wild gametes to Methow SFH for their program. Although the intent is to utilize adults returning to the hatchery, future plans may include capturing wild adults at Foghorn Dam for incorporation into the program. Details for this endeavor have yet to be drafted.

6.2.4) Genetic or ecological differences.

An effort is currently underway to attempt to verify the genetic lineages of the SCS in the Methow Basin. Much controversy has transpired over this issue. When scientists come to an acceptable agreement on the genetics issue, the data can be incorporated into this document.

6.2.5) Reasons for choosing.

The MC stock was chosen because of its listed status and availability.

6.3) Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic or ecological effects to listed natural fish that may occur as a result of broodstock selection practices.

Currently, no measures are in place as few "wild" SCS adults enter the facility. The intent of this supplementation program is to only collect enough adults for brood needs. All others will be placed back in the system for natural spawning.

SECTION 7. BROODSTOCK COLLECTION

7.1) Life-history stage to be collected (adults, eggs, or juveniles).

Adults only.

7.2) Collection or sampling design.

Broodstock is obtained from adults volunteering to the hatchery's collection ladder. The ladder operates from mid-May to mid-July, which covers the full spectrum of the run. Adults in excess of brood needs will be returned to the river for natural spawning.

7.3) Identity.

All adults of WNFH origin will carry a Coded-wire tag (CWT). Therefore, if a "wild" adult SCS enters the facility, it can be identified as such due to the absence of a CWT and/or by scale analysis.

7.4) Proposed number to be collected:

7.4.1) Program goal (assuming 1:1 sex ratio for adults):

Approximately 360 adults are needed to secure program goals.

7.4.2) Table 8. Broodstock collection levels for the last twelve years (e.g. 1988-99), or for most recent years available:

Year	Adults Females	Males	Jacks	Eggs	Juveniles
1988	849	471	7	2,114,503	1,121,395
1989	120	71	4	254,413	187,982
1990	75	45	1	144,500	135,123
1991	48	25	19	113,043	89,333
1992	236	85	11	872,814	478,941
1993	383	263	0	1,146,524	770,847
1994	16	12	1	119,642	112,695
1995	8	5	1	15,000	14,520
1996	107	79	19	345,893	324,851
1997	144	139	1	590,657	545,000
1998	103	77	0	437,837	377,696
1999	60	50	56	224,430	216,641

Data source: (Link to appended Excel spreadsheet using this structure. Include hyperlink to main database)

7.5) Disposition of hatchery-origin fish collected in surplus of broodstock needs.

All adults collected in surplus of broodstock needs will be returned to the river for natural spawning.

7.6) Fish transportation and holding methods.

Although rare, on occasion adults may be transferred to WNFH from Methow SFH or from a

Basin tributary trap. When this occurs, a truck designed for fish hauling will be utilized. All applicable fish health guidelines will be strictly adhered to.

7.7) Describe fish health maintenance and sanitation procedures applied.

Fish health services are provided by staff from the USFW Services Olympia Fish Health Center (OFHC) which is a full service aquatic health facility capable of monitoring, diagnostic, and certification procedures that meet or exceed all national, international, IHOT or co-manager requirements.

Pathogen and disease monitoring start with adult testing of captured populations for all reportable aquatic viruses and bacteria at the minimum assumed pathogen prevalence level of 5% (i.e. 60 individuals). In addition, all females spawned are specifically and individually tested for *R. salmoninarum*, the causative agent of BKD. This is essential to determine the pathogen levels and eliminate or segregate the resulting eggs from different risk levels. This process greatly reduces the impact of transmitting the disease from infected females to progeny. All eggs and accompanying containers are disinfected with iodine solution during the water hardening process following fertilization.

Juveniles are monitored throughout the rearing period by monthly visits by fish health biologists for routine purposes. More frequent diagnostics are performed if hatchery staff notices undue mortality or morbidity. Disease outbreaks are prevented or treated by legal application of appropriate chemicals or by modification of rearing parameters. During the rearing period, fish culture equipment is rinsed in disinfectant following use in each pond. Bird exclusion devices are used on all rearing units to minimize the spread of disease through bird predation. At the end of the rearing period, all production lots are again tested for reportable pathogens at the minimum assumed prevalence level of 5% prior to release.

7.8) Disposition of carcasses.

Since all females are injected with Erythromycin prior to spawning, they cannot be placed into basin tributaries for nutrient enhancement. These adults are buried on-site in an earthen pit. All post-spawn adult male carcasses are scatter planted in several basin tributaries for nutrient replacement under permits obtained from WDFW and FWS.

7.9) Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic or ecological effects to listed natural fish resulting from the broodstock collection program.

The risk of fish disease amplification will be minimized by following Co-manager Fish Health Policy sanitation and fish health maintenance and monitoring guidelines. Since “wild” fish rarely enter the collection facility, there is a minimal likelihood for adverse genetic or ecological effects to the natural population.

SECTION 8. MATING

Describe fish mating procedures that will be used, including those applied to meet performance indicators identified previously.

8.1) Selection method.
Prioritized based on hatchery or natural origin. Three stocks currently utilized are Winthrop (Carson), Methow Composite, and Twisp River stocks. Fish of natural origin (by scale pattern) are normally crossed with the listed Methow Composite stock. The program is currently phasing out the Winthrop stock and replacing it with the Methow Composite stock. All Twisp River stock gametes are transferred to the Methow State Fish Hatchery.

8.2) Males.
Run is consistently comprised of 60% females and 40% males. Therefore, all males are used at least once including jacks. Some adult males are used twice, but no more than twice, to compensate for the differing sex ratio. Backup males are only used when a problem is noticed with the milt (blood, water, etc.).

8.3) Fertilization.
Gametes are fertilized as 1:1 individual matings. Factorial matings have occurred in the past when returning adult numbers dropped below 50 individuals in order to maximize the effective population size. Fertilization does not occur until stock origin has been determined (coded wire tag). Therefore, all gametes are placed in individual zip-lock bags, oxygenated, and placed in coolers. Any containers used during the spawning and/or fertilization process are disinfected in an iodophore solution between fish. Isolation incubation buckets are used to prevent horizontal transmission of diseases until virology and ELISA results are obtained. All eggs are water hardened in a 75ppm iodophore solution.

8.4) Cryopreserved gametes.
Not used.

8.5) Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic or ecological effects to listed natural fish resulting from the mating scheme.
The Winthrop/Carson stock has been phased out of Winthrop NFH as of 2000, meaning that no eggs or fish of pure Carson origin have been out-planted to the Methow River System since release year 2000. The spring Chinook goal for Winthrop NFH will be to rear and release 600,000 Methow Composite stock annually. Broodstock collection and spawning plans still need to be organized with the Methow SFH program in order to maintain a wild broodstock component in the Methow Composite stock at both facilities (i.e., most Methow Composite crosses have been Hatchery X Wild). Factorial mating schemes will be used when/if effective population size drops below 50 individuals.

SECTION 9. INCUBATION AND REARING -

Specify any management *goals* (e.g. "egg to smolt survival") that the hatchery is currently operating under for the hatchery stock in the appropriate sections below. Provide data on the success of meeting the desired hatchery goals.

Survival goals for green egg to fry and fry to smolt are 95% each (IHOT 1995).

9.1) Incubation:

9.1.1) Number of eggs taken and survival rates to eye-up and/or ponding.

Table 9. Number of eggs taken and survival rates to eye-up, 1988 to 1999.

Brood Year	# Eggs Taken	% Eye-up
1988	2,279,773	93
1989	276,510	92
1990	149,000	96
1991	117,778	96
1992	916,000	95
1993	1,174,000	98
1994	120,000	97
1995	31,000	97
1996	445,000	93
1997	608,896	97
1998	376,848	95
1999	234,515	96

9.1.2) Cause for, and disposition of surplus egg takes.

Has not been an issue for most return years. Ideally, the facility would collect approximately 8% above the production goal number of 600,000 eggs in order to compensate for normal losses. Large returns during the Winthrop/Carson stock phase out, particularly brood year 2000 and 2001; have resulted in unusual plans for excess fish such as out-planting to watersheds outside the Methow Basin. These unusual plans have resulted from protests by Native American Tribes and the local public who are not in agreement with the phase out plan. The National Marine Fisheries Service has agreed to the out-planting of excess eggs or fry of Methow Composite origin to the Methow River and certain tributaries of the Methow River.

9.1.3) Loading densities applied during incubation.

Spring chinook salmon eggs average around 1800 eggs per pound, although there can be significant variation to this mean value from year to year depending on adult size and age composition for a particular brood year. From the incubation buckets, fish are transferred to the Heath trays at a loading of one isolation bucket (progeny of one female) per tray (3000 to 6000 eggs/tray). Flows in isolation buckets are 1 to 2 gpm to the eyed stage and 3 to 6 gpm in the Heath trays from the eyed to button-up fry stage.

9.1.4) Incubation conditions.

All spring chinook salmon eggs are incubated on 100% ground water. This water source is free of silt, does not create fungus problems, and provides constant temperatures in the 47 to 50F range during incubation. Dissolved oxygen is also relatively constant at 9ppm on the inflow and not less than 8ppm at the outflow. It is not necessary to use formalin during incubation since *saprolegnia* fungus or silt have not been a problem.

9.1.5) Ponding.

Spring Chinook are fully buttoned up at 1800 DTU and are ponded-out at this time. Swim-up fry average 1.3 - 1.4 inches (1200 to 1500 fish per pound). Ponding is forced as trays are removed from the Heath stacks and transferred to a tub of water and moved to the appropriate start tanks. Density indices are kept below 0.15 lbs/cu.ft./inch during early rearing.

9.1.6) Fish health maintenance and monitoring.

Disease monitoring is accomplished through daily observations by hatchery staff and monthly monitoring by fish health biologists/pathologists from the OFHC.

Any abnormal situations observed by hatchery personnel are called to the attention of the OFHC, which performs diagnostic and confirmatory clinical tests before recommending appropriate treatments. Treatment procedures may include environmental manipulation to control stresses and enhance the fish's ability to recover from infectious agents and/or appropriate chemicals or antibiotics. Antibiotics and chemicals that are registered for fish disease treatments are applied as per labeled instructions. Other therapeutic drugs and chemicals may be applied through appropriate INAD permits or by allowable extra-label prescription by staff Veterinary Medical Officer or local veterinarian.

Same as 9.1.4 for fungus control. Mild cases of coagulated yolk (White Spot) are sometimes present but have been insignificant in terms of losses. Dead eggs are removed by hand at the eyed stage or by a mechanical egg sorting machine in instances where mortality is higher than normal(>5%).

9.1.7) Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic and ecological effects to listed fish during incubation.
See above.

9.2) <u>Rearing</u>:

9.2.1) Provide survival rate data (*average program performance*) by hatchery life stage (fry to fingerling; fingerling to smolt) for the most recent twelve years (1988-99), or for years dependable data are available..

Table 10. Percent survival estimates for juvenile SCS, WNFH, 1988 to 1999.

Brood Year	Fry to Fingerling (%)	Fingerling to Smolt (%)
1988	na	na
1989	92	57
1990	96	65
1991	93	97
1992	77	78
1993	92	92
1994	96	98
1995	100	99
1996	97	99

1997	99	99
1998	96	95
1999	98	100

9.2.2) Density and loading criteria (goals and actual levels).
Density indices have been successful at or below the goal of 0.12 lbs/cu.ft./inch (DI) since the implementation of this goal in 1994. During early rearing, the maximum goal for DI's in the start tanks, has been 0.17. Once the fish are moved outside, after 2 to 3 months in the start tanks, the goal is to not exceed a DI of 0.11.

9.2.3) Fish rearing conditions
All spring Chinook salmon are reared on 100% ground water for the first year of rearing, if possible. Dissolved oxygen (DO) is periodically measured with a calibrated YSI digital meter and probe. DO is normally 9 to 10ppm at the inflow and 8 to 9ppm at the outflow of all rearing units. Surface water is mixed with ground water during the last 5 to 6 months of rearing, gradually increasing the percentage of surface water until release. The DO of surface water is normally at or near saturation at the given temperature. Thermographs are constantly monitoring temperature of the water sources and weekly temperatures are also taken at each group of rearing units. Ground water temperatures are quite constant with a small range of 47 to 52F. Surface water temperatures are directly affected by air temperatures and can vary significantly during each day and through the differing seasons. Temperatures can range from as low as 33 F in December to as high as 67 F in August. Total gas pressure has only been measured when suspected supersaturation problems occur. A Weiss saturometer was used during a gas bubble disease incident that occurred during low well levels. This created cavitation problems with the well pump and was producing total gas pressures 105 to 108 percent saturation. These problems have caused only very minor mortality. The few gas saturation problems which have occurred here have been solved by strategies such as adding screens to increase spray and nitrogen dissipation and shutting pumps down periodically to allow the wells to recharge for a number of days. Also see Table 14.

Table 11. Average monthly production density and flow indices, WNFH, 1990 to 1999

Month	Development Stage	Temp[1] ^{0}F Ave	Water source[2] % Well	% River	Flow GPM[3]	Flow Index (lbs./in.*GPM)[4]	Density Index (lbs./in.*ft^3)[4]
August	Egg	NA	100%	0%	NA	NA	NA
September	Egg	NA	100%	0%	NA	NA	NA
October	Egg	NA	100%	0%	NA	NA	NA
November	Sac Fry	NA	100%	0%	NA	NA	NA
December	Fry	49.3	100%	0%	729	0.53	0.12
January	Fry	47.1	100%	0%	2,423	0.41	0.05
February	Fry	44.0	100%	0%	1,953	0.59	0.07
March	Fingerlings	46.8	100%	0%	2,304	0.70	0.08
April	Fingerlings	46.0	100%	0%	2,280	0.79	0.10
May	Fingerlings	48.0	100%	0%	3,805	0.57	0.09
June	Fingerlings	48.0	100%	0%	5,044	0.57	0.07
July	Fingerlings	51.0	100%	0%	5,269	0.63	0.08
August	Fingerlings	52.0	100%	0%	5,338	0.69	0.08
September	Fingerlings	50.3	100%	0%	5,346	0.71	0.09
October	Fingerlings	50.4	100%	0%	5,959	0.81	0.10
November	Yearlings	48.0	60%	40%	5,822	0.88	0.10
December	Yearlings	47.5	50%	50%	5,663	1.97	0.11
January	Yearlings	42.3	40%	60%	5,768	1.02	0.12
February	Yearlings	43.7	30%	70%	5,813	1.05	0.12
March	Yearlings	45.0	20%	80%	9,708	0.70	0.13
April	Smolt	48.0	20%	80%	NA	NA	NA

Unless otherwise indicated, all values are for end of the month totals or values obtained for the last ten days of the month and not daily averages for the month.

Dissolved oxygen is measured during critical periods of disease, elevated temperatures, restricted flows, or fouled water. Minimum d0^2 for salmonids is 5 mg/L (Piper et al., 1992)*. To date WNFH has not been below this value (M. Ahrens pers.comm. 9/09/02).

[1]Temprature data is manually measured weekly and averaged for the month

[2]Data indicated approximate water source usage. Actual usage depends on a variety of factors including disease and maintaining water (through well water inclusion) temperatures to minimize the formation of slush ice water.

[3] Estimated GPM used by brood. Calculated by dividing total weight (lbs.) by the length (inches) multiplied by the flow.

[4]Index averaged from Winthrop NFH lot history records from this brood year (1997).

*Piper, R.G., I.B. McElwain, L.E. Orme, J.P. McCraren, L.G. Fowler, & J.R. Leonard. 1982 Fish Hatchery Management. US Department of Interior. Pp 503.Washington DC.

9.2.4) Indicate biweekly or monthly fish growth information (*average program performance*), including length, weight, and condition factor data collected during rearing, if available.

Table 12. WNFH - Rearing Environment Model for Spring Chinook, average values.

Month	Development Stage	Number on hand	Total Weight	Ave Size (#/lb)	Ave Size gms	Length Ave (mm)	Length Ave (in)	Condition Factor (K= gms/mm^3)	Growth Rate (mm/mo.)
August	Egg	NA	NA	NA	NA	NA	NA	NA	NA
September	Egg	NA	NA	NA	NA	NA	NA	NA	NA
October	Egg	NA	NA	NA	NA	NA	NA	NA	NA
November	Sac Fry	518,234	NA	NA	NA	NA	NA	NA	NA
December	Fry	517,142	502.00	1030.2	0.4	33.02	1.30	1.22410E-05	NA
January	Fry	516,696	1,351.00	382.5	1.2	34.54	1.36	2.87977E-05	NA
February	Fry	598,954	2,685.00	223.1	2	59.18	2.33	9.81833E-05	NA
March	Fingerlings	598,804	4,387.00	136.5	3.3	69.09	2.72	1.00863E-05	9.91
April	Fingerlings	598,593	5,205.00	115.0	3.9	73.41	2.89	9.98045E-06	4.32
May	Fingerlings	598,053	6,875.00	87.0	5.2	80.52	3.17	9.99793E-06	7.11
June	Fingerlings	548,086	11,127.00	49.3	9.2	98.30	3.87	9.70401E-06	17.78
July	Fingerlings	547,972	13,511.00	40.6	11.2	103.36	4.07	1.01321E-05	5.09
August	Fingerlings	547,677	16,244.00	33.7	13.5	112.02	4.41	9.58092E-06	8.64
September	Fingerlings	547,333	17,118.00	32.0	14.2	114.55	4.51	9.44553E-06	2.54
October	Fingerlings	547,168	23,457.00	23.3	19.5	132.44	4.86	1.03466E-05	8.89
November	Yearlings	547,097	25,721.00	21.3	21.3	127.51	5.02	1.02960E-05	4.06
December	Yearlings	546,982	28,838.00	19.0	23.9	133.35	5.25	1.00941E-05	5.84
January	Yearlings	546,656	31,713.00	17.2	26.3	136.91	5.39	1.02639E-05	3.56
February	Yearlings	545,985	33,447.00	16.3	27.8	139.19	5.48	1.03131E-05	2.29
March	Yearlings	545,392	39,552.00	13.8	32.9	147.83	5.82	1.01917E-05	8.64
April	Smolt	545,062	41,434.00	13.2	34.5	150.11	5.91	1.02024E-05	2.29

Unless otherwise indicated, all values are for end of the month totals or values obtained for the last ten days of the month and not daily averages for the month.

Dissolved oxygen is measured during critical periods of disease, elevated temperatures, restricted flows, or fouled water. Minimum d0^2 for salmonids is 5 mg/L (Piper et al., 1992)*. To date WNFH has not been below this value (M. Ahrens pers.comm. 9/09/02).

*Piper, R.G., I.B. McElwain, L.E. Orme, J.P. McCraren, L.G. Fowler, & J.R. Leonard. 1982 Fish Hatchery Management. US Department of Interior. Pp 503.Washington DC.

9.2.5) Indicate monthly fish growth rate and energy reserve data (*average program performance*), if available.

Energy reserve data, through routine monitoring of body fat content, is not conducted on a routine basis. On a quartly basis, fish health profiles are conducted through the collection of a Goede Index that ascribes qualitative values to external and internal observations of fish health. Data is available through WNFH. Also see Tables 12 (above and Table 13 (below).

Table 13. WNFH feed type, application rates, and food/length conversion rates for an average production year.

Month	Development Stage	Feed Type	Feed Fed Per Day (lbs)	Total Fed (lbs./mo.)	Feeding Rate %BW/day[1]	Food Conversion (lbs.Fed/lb. Gain)	Conversion Temp. Units per in. growth[1]
August	Egg	NA	NA	NA	NA	NA	NA
September	Egg	NA	NA	NA	NA	NA	NA
October	Egg	NA	NA	NA	NA	NA	NA
November	Sac Fry	NA	NA	NA	NA	NA	NA
December	Fry	BioDiet™-Starter	5	148	1.00%	NA	NA
January	Fry	BioDiet™-Starter	17	512	1.26%	0.60	28
February	Fry	BioMoist™-Grower	40	1100	1.49%	0.82	49
March	Fingerlings	BioMoist™-Grower	52	1622	1.19%	0.95	41
April	Fingerlings	BioMoist™-Grower	63	1886	1.21%	2.31	94
May	Fingerlings	BioMoist™-Grower	90	2776	1.31%	1.66	58
June	Fingerlings	BioMoist™-Feed	130	3887	1.17%	0.91	24
July	Fingerlings	BioMoist™-Feed	123	3801	0.91%	1.59	98
August	Fingerlings	BioMoist™-Feed	133	4106	0.82%	1.50	67
September	Fingerlings	BioMoist™-Feed	158	4753	0.92%	5.44	221
October	Fingerlings	BioMoist™-Feed	195	6058	0.82%	0.96	47
November	Yearlings	BioMoist™-Feed	189	5667	0.73%	2.50	90
December	Yearlings	BioMoist™-Feed	111	3450	0.38%	1.11	49
January	Yearlings	BioMoist™-Feed	89	2756	0.28%	0.96	83
February	Yearlings	BioMoist™-Feed	96	2680	0.29%	1.55	127
March	Yearlings	BioMoist™-Feed	172	5331	0.43%	0.87	41
April	Smolt	BioMoist™-Feed	191	2865	0.46%	1.52	174

Unless otherwise indicated, all values are for end of the month totals or values obtained for the last ten days of the month and not daily averages for the month.

Dissolved oxygen is measured during critical periods of disease, elevated temperatures, restricted flows, or fouled water. Minimum $d0^2$ for salmonids is 5 mg/L (Piper et al., 1992)*. To date WNFH has not been below this value (M. Ahrens pers.comm. 9/09/02).

1-Factor utilized to determine feed application rates calculated as the %body weight(BW) in total mass divided by total pounds fed.

9.2.6) Indicate food type used, daily application schedule, feeding rate range (e.g. % B.W./day and lbs/gpm inflow), and estimates of total food conversion efficiency during rearing (*average program performance*).
See Table 13 (above).

9.2.7) Fish health monitoring, disease treatment, and sanitation procedures.
Disease monitoring is accomplished by daily visual observations by hatchery staff and twice monthly monitoring by fish health biologists/pathologists from the OFHC. After adult collection and sorting, adult females held for spawning are injected with 20mg per kg fish weight of Erythromycin under supervision of an attending Veterinary Medical Officer. Injections are done at approximately 30-day intervals to control levels of *R. salmoninarum*. During spawning operations, adult populations are tested for all reportable fish pathogens at the minimum assumed pathogen prevalence level (APPL) of 5%. At least 150 female adults are tested for viruses and all females are individually tested for levels of *R. salmoninarum* by ELISA. The results are used to segregate egg

groups into relative risk groups to reduce and contain any vertical transmission of *R. salmoninarum* and resultant Bacterial Kidney Disease. At least 3 weeks prior to release, all smolt lots are tested for reportable pathogens at the 5% APPL. All test records and results are on file at the Olympia Fish Health Center.

Any abnormal situations observed by hatchery personnel are called to the attention of the Olympia Fish Health Center, which performs diagnostic and confirmatory clinical tests before recommending appropriate treatments. Treatment procedures may include environmental manipulation to control stresses and enhance the fish's natural ability to recovery from infectious agents and/or appropriate chemicals or antibiotics. Antibiotics and chemicals that are registered for fish disease treatments are applied as per labeled instructions. Other therapeutic drugs and chemicals may be applied through appropriate INAD permits or by allowable extra-label prescription by staff Veterinary Medical Officer or local Veterinarian.

9.2.8) Smolt development indices (e.g. gill ATPase activity), if applicable.
Currently not conducted. Data not readily available, however Robin Schrock et. al. (USGS) published several reports to BPA containing data (samples taken in the mid-90's) and information relating gill ATPase activity to downstream travel time on smolts sampled at Winthrop NFH.

9.2.9) Indicate the use of "natural" rearing methods as applied in the program.
Winthrop NFH first began using enriched environments to rear at least some fish beginning with the 1994 brood. Our most current efforts to offer enriched rearing environments began with the 1998 brood. That study is ongoing and annually utilizes about 120,000 fish. It started with Carson ancestry fish but switched to listed fish when they became available. The study fish are reared in raceways with floating cover, in-pond structure, and demand feeders. Adult returns from the most recent studies should begin returning as 4 year olds in 2002 and will be compared to adults returning from more conventional (but low density) rearing.

9.2.10) Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic and ecological effects to listed fish under propagation.
We have already noted some of the fish cultural studies/changes happening at Winthrop NFH. These studies and changes incorporate risk aversion measures that simulate more natural conditions and should minimize domestication selection within the hatchery. Over the years, other studies have occurred at Methow SFH. We agree that as both programs evolve to rear and recover listed fish, new fish cultural research opportunities will be present. We also expect that the recent agreement on the appropriate use of Carson-ancestry fish in 2001 and the agency/tribal commitment to work toward a long term agreement will lead to new research into the genetics of spring chinook in the system and possibly more work on evaluating the success of hatchery fish spawning in natural environments.

SECTION 10. RELEASE

Describe fish release levels, and release practices applied through the hatchery program.

10.1) Table 14. Proposed fish release levels.

Age Class	Maximum Number	Size (fpp)	Release Date	Location
Eggs	0			
Unfed Fry	0			
Fry	0			
Fingerling	0			
Yearling	600,000	15 to 20	April 10 - 20	Methow River

10.2) Specific location(s) of proposed release(s).

Stream, river, or watercourse: Methow River (WRIA 48)
Release point: rkm 81
Major watershed: Columbia River
Basin or Region: Upper Columbia Basin

10.3) Table 15. Actual numbers and sizes of fish released by age class through the program.

Release year	Eggs/ Unfed Fry	Avg size	Fry	Avg size	Fingerling	Avg size	Yearling	Avg size
1988							1,090,200	14.6
1989			250,000	800			866,000	14.9
1990					203,000	79	1,121,000	15.0
1991					418,000	82	987,000	19.5
1992					176,000	52	625,000	16.0
1993							951,000	18.0
1994							556,000	18.8
1995							771,000	15.3
1996							113,000	12.9
1997							14,500	12.8
1998							325,000	13.8
1999							545,000	13.1
Average			20,833	800	66,417	71	663,725	15.4

10.4) Actual dates of release and description of release protocols.

Table 16. Release dates, how, what stage, and where released, WNFH.

Migration Year	Release Date	Type Release	Life Stage	Release Site
1997	April 9	Forced	Yearling/smolt	Methow River at Winthrop
1998	April 14	Forced	Yearling/smolt	Methow River at Winthrop
1999	April 15	Forced	Yearling/smolt	Methow River at Winthrop
2000	April 11	Forced	Yearling/smolt	Methow River at Winthrop
2001	April 17	Forced	Yearling/smolt	Methow River at Winthrop

Previous to migration year 2000, a specific date was chosen based on the start of bypass operations at downstream hydroelectric projects. The last two years (2001, 2002), the option was given to release during a window of opportunity (increasing flows and turbidity) while bypass operations were in place. The rearing units used for spring Chinook are not set up for volitional release, and would require considerable modifications in order to function correctly during a volitional release.

10.5) Fish transportation procedures, if applicable.

Spring Chinook salmon are generally not transported off station for release. However, if numbers of fish on station exceed program goals, some fish may be transported to tributary streams or to a different watershed. Washington Department of Fish and Wildlife has the most convenient fish hauling trucks and would likely be involved in any fish transportation. These trucks are set up with oxygen tanks and aerators. Truck tanks are loaded at 0.3 to 0.5 pounds of fish per gallon of water. Transport time to release sites is under one hour.

10.6) Acclimation procedures.

At this time, all acclimation occurs at Winthrop NFH. Fish are reared on 100% ground water for the first 12 months of the 18-month rearing cycle, if possible. River water is gradually introduced during the 13th or 14th month of rearing. The percentage of river water is gradually increased each month to a final mixture of about 80% river water and 20% ground water for at least the last two months of rearing.

10.7) Marks applied, and proportions of the total hatchery population marked, to identify hatchery adults.

All (100%) listed spring Chinook salmon have been coded-wire tagged (CWT), and will continue to be 100% marked with CWT's in the future. Broods previous to 2000 were also adipose fin clipped. Starting with brood year 2000, listed stocks will not receive a fin clip along with the CWT, while unlisted stocks will continue to receive fin clips in order to help differentiate listed and unlisted stocks without having to kill the fish first. Passive Integrated Transponders (PIT) are also used on a smaller scale. Numbers of PIT- tagged fish released have ranged from 7500 to 27,500 in recent years.

10.8) Disposition plans for fish identified at the time of release as surplus to programmed or approved levels.

The current plan for surplus listed spring Chinook salmon allows for out-planting of fish to tributary streams during early life stages. Winthrop NFH does not have the capability (space or water) to rear surplus spring Chinook salmon to the smolt stage.

10.9) Fish health certification procedures applied pre-release.
Sixty fish from all juvenile lots are sampled and tested for reportable bacterial and viral pathogens with methods that meet or exceed all national, international, IHOT or co-manager requirements. Semi-monthly monitoring of juveniles for parasites, gill, internal organ and overall condition continues until release.

10.10) Emergency release procedures in response to flooding or water system failure.
Emergency releases could occur only when no other choice is available. National Marine Fisheries Service must be contacted within 24 hours after the release. Listed spring Chinook salmon are the preferred fish to be released first, followed by listed summer steelhead as their impacts to wild fish would be less than coho.

10.11) Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic and ecological effects to listed fish resulting from fish releases.
All releases of spring Chinook salmon occur when fish are fully smolted in mid to late April. Releases are normally timed with rising river conditions which helps move fish out of the system swiftly. Spring Chinook released from this facility do not stay around for more than 24 hours following a release. Sonar equipment at Wells Dam, the first dam about 60 miles below Winthrop NFH, usually detects large schools of our fish within 24 hours of release time. Passive Integrated Transponders (PIT) verify this swift movement with detections at Rocky Reach Dam shortly thereafter. Very few residual fish, generally less than a dozen, are observed at the hatchery outfall for any length of time following a release.

SECTION 11. MONITORING AND EVALUATION OF PERFORMANCE INDICATORS

11.1) Monitoring and evaluation of "Performance Indicators" presented in Section 1.10.

11.1.1) Describe plans and methods proposed to collect data necessary to respond to each "Performance Indicator" identified for the program.

Legal Mandates
Performance Indicator 1a:
- Ensure, when possible, that production numbers meet those negotiated through *U.S. v. Oregon.*
- Estimate WNFH's contribution to harvest through CWT recoveries.

Performance Indicator 2a:
- ESA consultations under Section 7 and 10 have been submitted and accepted. Modifications to existing BA's are completed to cover any program changes.

Harvest
Performance Indicators 3a – 3c:
- Estimate number of fish harvested through CWT recoveries.

- Mark production sufficiently to obtain statistically valid evaluation data. Current production is 100% marked. All unlisted stocks carry an adipose fin-clip, whereas the listed stocks are ad-present.

Conservation of Wild/Naturally Spawning Populations

Performance Indicators 4a – 4c and 5a and 5b:

- Estimate contribution to natural spawning through retrieval and de-coding of CWT's obtained on the spawning grounds. Also see above.

Life History Characteristics

Performance Indicators 6a – 9d:

- Release numbers do not exceed mitigated requirement or level stated in hatchery BiOp.
- No listed juveniles released outside of the Methow Basin.
- Ensure release dates coincide with wild fish migration timing.
- Smolts are released during or just prior to smoltification, which promotes a rapid migration.
- Estimate travel time and survival through the Columbia corridor using data obtained from PIT tag recoveries at mainstem hydroelectric dams.
- Bio-sample all returning adults at the hatchery. Produce annual report covering life history characteristics of the hatchery population.

Genetic Characteristics

Performance Indicators 10a – 13a:

- Juveniles are force released directly from the hatchery to promote homing back to the facility.
- Mark juveniles sufficiently to obtain valid stray-rate estimates.
- Stray rates are calculated through CWT recoveries on the natural spawning grounds.
- Estimate optimal release time using historical emigration data and hatchery records.
- As in years past, continue to take tissue samples from the hatchery population for genetic comparison to the "natural" population.
- Continue to obtain and utilize adults taken from throughout the entire spectrum of the run.

Research Activities

Performance Indicators 14a – 15b:

- Promote and conduct experiments as stated in the 2001 NMFS BiOp, when feasible. Study designs are peer reviewed when applicable.
- Annual reports are prepared covering bio-sampling of hatchery adults, return estimates by brood year, harvest, and stray rates.

Operation of Artificial Production Facilities

Performance Indicators 16a – 23a:

- Produce annual reports indicating level of compliance with applicable standards and criteria.
- Effluent is monitored weekly to ensure compliance with NPDES guidelines.

- Conduct monthly fish health monitoring and a pre-release examination. Adherence to regional fish health protocols is strictly maintained.
- Ensure rearing densities are within designated ranges.
- All male carcasses are deployed in basin tributaries. Permits were secured through WDFW and USFWS. Annual reports are submitted to appropriate agencies.
- Release juveniles at size ranges as stated in IHOT, 1995.
- In the future, conduct size-at-release evaluation to determine range most beneficial to both hatchery and wild populations.
- Water delivery system is in compliance with applicable standards.

11.1.2) Indicate whether funding, staffing, and other support logistics are available or committed to allow implementation of the monitoring and evaluation program.
Current funding fully supports the evaluation program as is. The BOR has been supportive of funding, as necessary.

11.2) Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic and ecological effects to listed fish resulting from monitoring and evaluation activities.
Conduct monitoring and evaluation program in accordance with guidelines presented in the Biological Opinion covering this facility.

SECTION 12. RESEARCH

Currently, no research is conducted outside hatchery grounds. Other than study stated below, please refer to NMFS permit #'s 1119 and 1300.

12.1) Objective or purpose.
WNFH is conducting a "natural rearing" study which started with BY 1998. The objective is to release a juvenile which is better adapted to the natural environment, while increasing their chances to survive to adulthood.

12.2) Cooperating and funding agencies.
BOR.

12.3) Principle investigator or project supervisor and staff.
David Carie – Hatchery Evaluation team leader, Fisheries Management Biologist.

12.4) Status of stock, particularly the group affected by project, if different than the stock(s) described in Section 2.
Same.

12.5) Techniques: include capture methods, drugs, samples collected, tags applied.
Raceways are set up with; floating cover, woody debris, substrate, and automatic feeders. Groups are differentially CWT'ed for evaluation.

12.6) Dates or time period in which research activity occurs.
Ongoing.

12.7) Care and maintenance of live fish or eggs, holding duration, transport methods.
See 12.5

12.8) Expected type and effects of take and potential for injury or mortality.
No take is expected.

12.9) Level of take of listed fish: number or range of fish handled, injured, or killed by sex, age, or size, if not already indicated in Section 2 and the attached "take table" (Table 1).
No take is expected.

12.10) Alternative methods to achieve project objectives.
None

12.11) List species similar or related to the threatened species; provide number and causes of mortality related to this research project.
None.

12.12) Indicate risk aversion measures that will be applied to minimize the likelihood for adverse ecological effects, injury, or mortality to listed fish as a result of the proposed research activities.
None, as no adverse effects are foreseen.

SECTION 13. ATTACHMENTS AND CITATIONS

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SECTION 14. CERTIFICATION LANGUAGE AND SIGNATURE OF RESPONSIBLE PARTY

"I hereby certify that the information provided is complete, true and correct to the best of my knowledge and belief.

Name, Title, and Signature of Applicant:

Certified by_____________________________ Date:_____________

Table 1. Estimated listed salmonid take levels of by hatchery activity.

Listed species affected: _UCR spring Chinook salmon_________________ ESU/Population:__UCR – Methow Composite ________________________________ Activity: Hatchery production____________________				
Location of hatchery activity: Winthrop NFH______________________ Dates of activity:_ongoing____________ Hatchery program operator:_USFWS________________				
Type of Take	**Annual Take of Listed Fish By Life Stage *(<u>Number of Fish</u>)***			
	Egg/Fry	Juvenile/Smolt	Adult	Carcass
Observe or harass a)				
Collect for transport b)			<10	
Capture, handle, and release c)			All above brood needs.	
Capture, handle, tag/mark/tissue sample, and release d)				
Removal (e.g. broodstock) e)			360	
Intentional lethal take f)			360	
Unintentional lethal take g)			<20	
Other Take (specify) h)				

a. Contact with listed fish through stream surveys, carcass and mark recovery projects, or migrational delay at weirs.
b. Take associated with weir or trapping operations where listed fish are captured and transported for release.
c. Take associated with weir or trapping operations where listed fish are captured, handled and released upstream or downstream.
d. Take occurring due to tagging and/or bio-sampling of fish collected through trapping operations prior to upstream or downstream release, or through carcass recovery programs.
e. Listed fish removed from the wild and collected for use as broodstock.
f. Intentional mortality of listed fish, usually as a result of spawning as broodstock.
g. Unintentional mortality of listed fish, including loss of fish during transport or holding prior to spawning or prior to release into the wild, or, for integrated programs, mortalities during incubation and rearing.
h. Other takes not identified above as a category.

<u>Instructions</u>:

1. *An entry for a fish to be taken should be in the take category that describes the greatest impact.*
2. *Each take to be entered in the table should be in one take category only (there should not be more than one entry for the same sampling event).*
3. *If an individual fish is to be taken more than once on separate occasions, each take must be entered in the take table.*